

Positrusion Filament Recycling System, Phase I

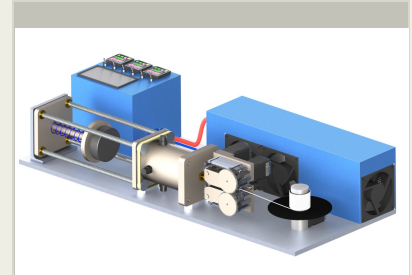
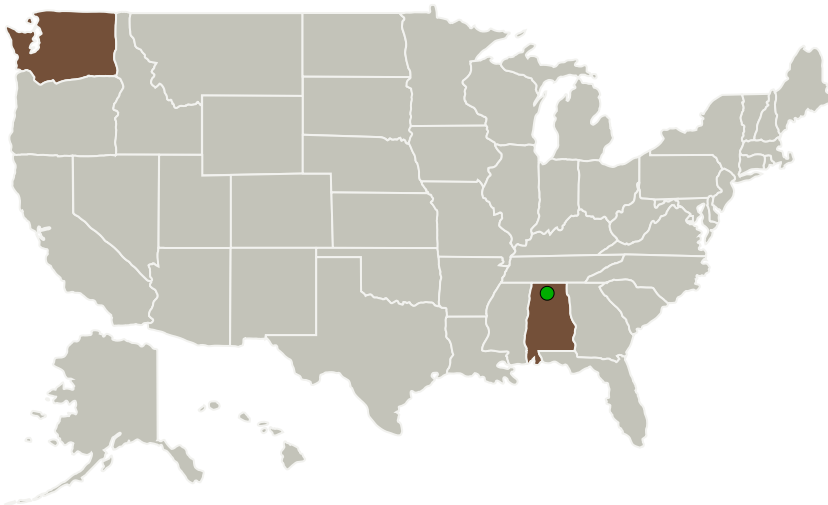
Completed Technology Project (2014 - 2014)



Project Introduction

TUI proposes a novel process to produce 3d printer feedstock filament out of scrap ABS on the ISS. Currently the plastic filament materials that most 3d printers use are produced with screw-based extruders that are fundamentally designed for high volume terrestrial production from uniformly pelletized resin feedstock. These require relatively large continuous batch sizes with significant operator inputs and have generally poor control over the produced filament geometry. Existing extrusion machines also tend to rely on separate facilities for fully drying the material beforehand, and do not inherently provide tight flow-rate control. The proposed effort will develop a filament extruding machine that uses a process called Positrusion that is designed from the ground up for optimally producing small batches of positively controlled round filament directly out of arbitrarily shaped scraps of ABS plastic, while meeting requirements for operation on the ISS. The machine will accept miscellaneous ABS parts, it will dry and degas the input material before melting and extruding it through a die, and the cross-sectional dimensions and feed-rate of the cooling extrudate will be tightly controlled in a continuous analog of closed-die molding.

Primary U.S. Work Locations and Key Partners



Positrusion Filament Recycling System Project Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Positrusion Filament Recycling System, Phase I

Completed Technology Project (2014 - 2014)



Organizations Performing Work	Role	Type	Location
Tethers Unlimited Inc	Lead Organization	Industry	
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Washington

Project Transitions

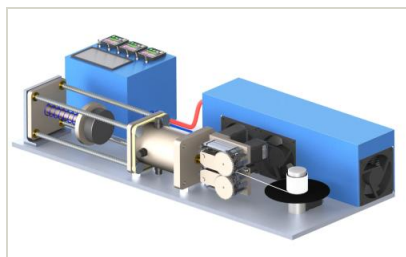
▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140728>)

Images



Project Image

Positrusion Filament Recycling System Project Image

(<https://techport.nasa.gov/image/136280>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tethers Unlimited Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

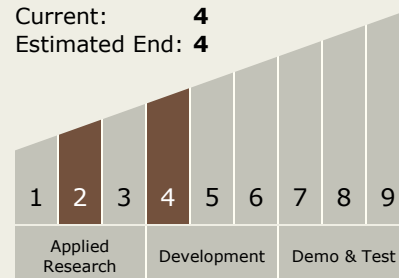
Carlos Torrez

Principal Investigator:

Jesse I Cushing

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



Positrusion Filament Recycling System, Phase I

Completed Technology Project (2014 - 2014)



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.6 Repurpose Processes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System